

KASI Combination Center Report

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Abstract

This report introduces the activities of the Korea Astronomy and Space Science Institute (KASI) as an IVS Combination Center and shows preliminary combination results. We adopted ADDNEQ2, which is a subprogram of the Bernese GPS software, to stack the normal equations and to estimate the parameters. We also modified the program to apply it to the VLBI daily SINEX format. Our preliminary results, combined station coordinate residuals with respect to the individual solutions of Analysis Centers, show mm to cm-level accuracy. Starting in the second half of 2010, we will provide our official combination products.

1. General Information

KASI was accepted as an IVS Combination Center on October 21, 2008. The KASI Headquarters is located in the Daeduk Research and Development Complex, Daejeon. The space geodesy research of KASI was started in 1992 with GPS. Currently, the KASI Space Geodesy Research Group mainly works on the application and the combination of space geodetic techniques.

2. Component Description

The mission of the KASI Combination Center is:

- to create high quality combination products
- to control the quality of the Analysis Centers' results
- to provide feedback to the Analysis Centers
- to adhere to the IERS Conventions

3. Staff

Table 1. Personnel at the KASI Combination Center

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4. Current Status and Activities

(1) Analysis S/W

For combination analysis, we use the Bernese S/W which is a GPS data processing program. SNX2NQ0 and ADDNEQ2, subprograms of the Bernese S/W, are mainly used. The inputs to the

Bernese S/W are the N.E. (Normal Equation) Matrix and the N.E. vector from every daily SINEX file of the individual ACs since we adopted the Normal Equation level combination. First, the input SINEX files are converted to Normal Equation format (*.NQ0) by the SNX2NQ0 program. The processing flow is described in Figure 1. The output is a daily SINEX file with combined station coordinates and EOP.

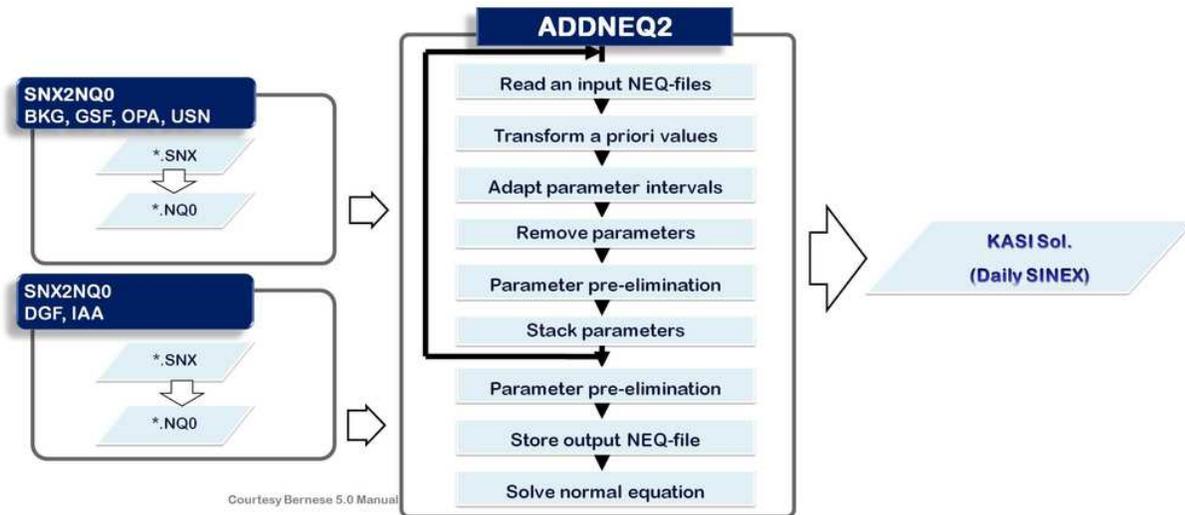


Figure 1. Combination processing flow

(2) Preliminary Results

We combined the individual solutions of four ACs—BKG, GSFC, OPA, and USNO—for six sessions during January 2008. We could not combine the solutions of DGF and IAA because the daily SINEX files of DGF and IAA need additional processing to be converted to NQ0 format. Figures 2, 3, and 4 show the residuals of the combined station coordinates with respect to the individual solutions, and Figures 5 and 6 show the residuals of combined EOP with respect to the individual solutions.

5. Future Plans

First of all, we will continue verifying the Bernese S/W using each solution of the individual ACs one by one, since some of the earth orientation parameters (EOP) look biased. After verification of the Bernese S/W, we will produce NQ0 format files for DGF and IAA to combine all of the ACs' products. We will also establish the automated combination processing with the Bernese Processing Engine (BPE). This automated processing will produce an IVS combination solution for the whole period (1984 to present) easily and rapidly.

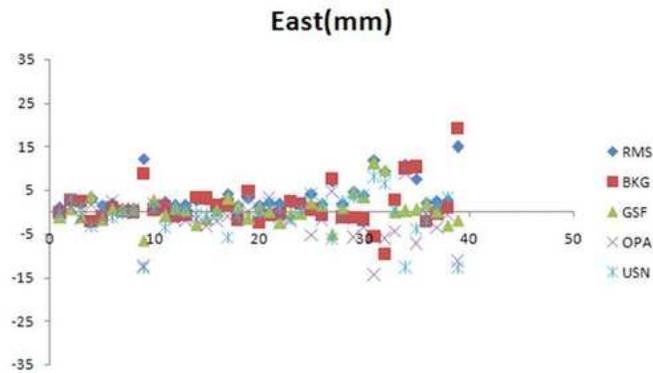


Figure 2. Residuals of East component

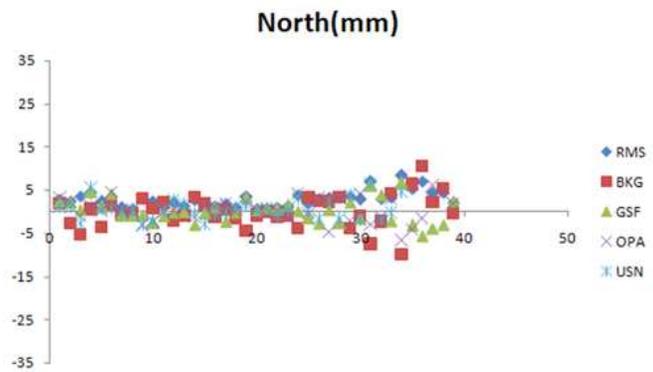


Figure 3. Residuals of North component

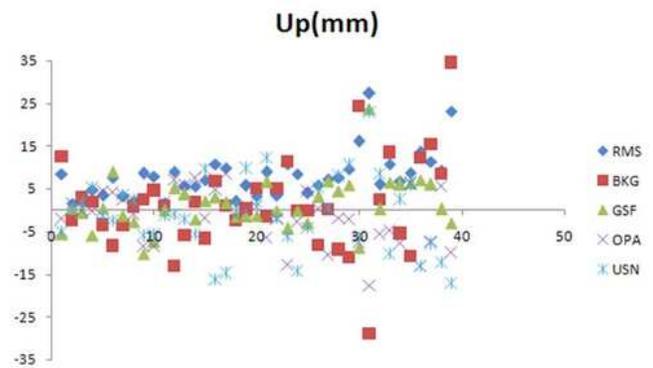


Figure 4. Residuals of Up component

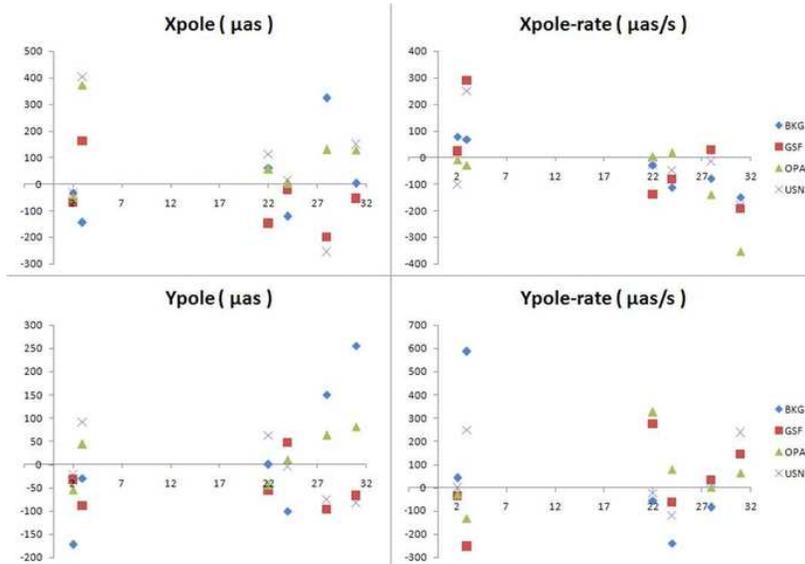


Figure 5. Residuals of X-pole, Y-pole, and their rates

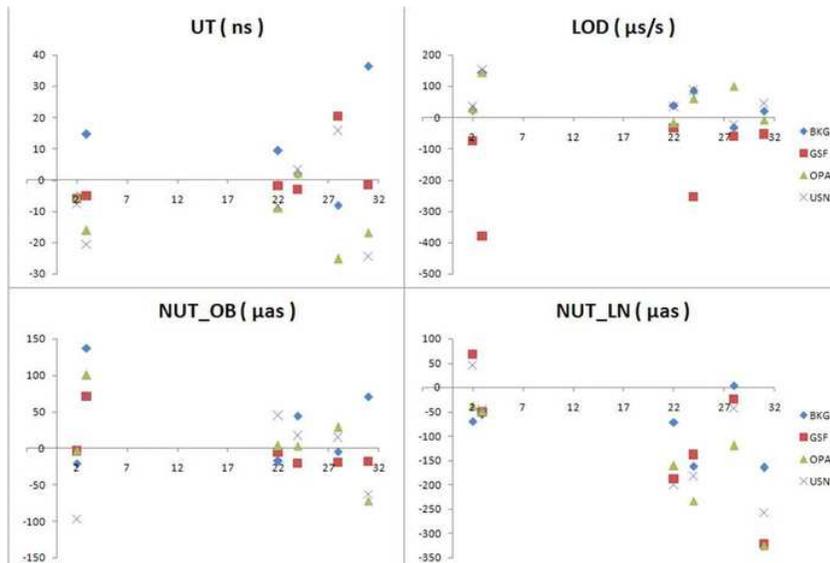


Figure 6. Residuals of UT1, LOD, and Nutation